

# Chapter 1

## matRiks: An R package for the automatic generation of rule-based matrices

*by*

**Abstract** Few resources are available for the automatic generation of Raven-like matrices. Some of them are no longer working, while others are hardly customizable without advanced programming skills. Although an R package exists for generating stimuli for psychological assessments, it is currently confined to create rotation of the same shape. The **matRiks** package has been developed with the aim of overcoming the above mentioned issues. This package generates matrices according to different types of rules, from the most basic ones based on the visuo spatial features of the figures to the most complex ones, based on inferential and inductive reasoning. This unveils the possibility of generating new customizable stimuli and of systematically manipulating the complexity of the stimuli. Being developed within the R environment, the **matRiks** package is completely open-source, allows for the reproducibility of the stimuli, and it can be easily used by people with basic knowledge of the R language.

### 1 Introduction

Cattell (1963) defined fluid intelligence ( $g$ ) as the ability of solving novel reasoning problems that has little to do with concepts learned in schools or through acculturational processes. The adjective “fluid” explicitly refers to its ability to “flow” into a variety of tasks and cognitive activities (Horn, 1972). Given this definition of fluid intelligence, it appears natural that the instruments used for its evaluation tap on the respondent’s ability to solve abstract problems that involve acculturation as little as possible, such as figural analogies, figure classifications, matrices, and number and letter series (Horn, 1968).

The Raven’s progressive matrices (RPM, Raven (1938)) are among the most famous tools for the assessment of  $g$ . The RPM consists in a series of non-verbal multiple-choice stimuli where respondents are required to complete a series of drawings composed of different figures by identifying the relevant features that rule the relationships between the figures. These drawings are often referred to as matrices. To pursue this aim, the respondents must choose the figure that complete the drawing among a list of other figures, the so-called distractors. This task should measure the ability of the respondents to identify and take into account the features (also called “rules”) that govern the relationship between the figures to compose the drawing. Different versions of the RPM exist, according to the target population (i.e., children with less than 12 years of age or adults) to which they are administered. The Colored Progressive Matrices (CPM, cit) are composed of sets of  $2 \times 2$  matrices (i.e., 4-cell matrices), some of which (CONTROLLARE) includes colored figures. The advanced progressive matrices (ADM, cit) are composed of sets of  $3 \times 3$  matrices meant for assessment in gifted population (DIRE MEGLIO). Finally, the RPM are meant for the assessment among the general population and are composed of both  $2 \times 2$  and  $3 \times 3$  matrices. The colored figures are present only in the CPM.

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## References

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